

NON-PUBLIC?: N  
ACCESSION #: 9103270208  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: VOGTLE ELECTRIC GENERATING PLANT - UNIT 2 PAGE: 1  
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DOCKET NUMBER: 05000425

TITLE: FAILURE OF TEMPERATURE CHANNEL CIRCUIT CARD DURING NI  
SURVEILLANCE CAUSES REACTOR TRIP

EVENT DATE: 02/23/91 LER #: 91-006-00 REPORT DATE: 03/21/91

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: S. H. CHESTNUT, NUCLEAR SAFETY AND TELEPHONE: (404) 826-3600  
COMPLIANCE

COMPONENT FAILURE DESCRIPTION:

CAUSE: X SYSTEM: JC COMPONENT: AMP MANUFACTURER: W120  
X SB PCV M120

REPORTABLE NPRDS: Y  
Y

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On 2-23-91, with the overpower delta-T (OPDT) and overtemperature delta-T (OTDT) bistables for reactor protection channel IV tripped for surveillance testing purposes, Reactor Coolant Loop 1 narrow range average temperature (T-avg) failed low. Personnel performing the surveillance on protection channel IV were promptly directed to back out of their procedure and restore the channel to service. However, before any action could be taken, the OPDT and OTDT bistables for protection channel I tripped, and a reactor trip occurred at 1138 CST on OTDT since the required 2 out of 4 logic was satisfied. With the exception of a steam-dump-to-condenser valve that failed open, no equipment malfunctions or abnormalities occurred following the reactor trip and by 1158 CST the

plant had been stabilized in Hot Standby.

A subsequent review of computer data indicated that after failing low, Loop 1 T-avg returned to near normal immediately prior to the reactor trip. Utilizing the plant simulator, it was demonstrated that if the signal from the Loop 1 T-hot narrow range temperature instrument failed low slowly and then returned to normal, the channel I OPDT and OTDT bistables would trip due to the apparent sudden increase in temperature. Troubleshooting of the Loop 1 T-hot instrument channel found that a power supply on a Westinghouse 7300 Series RTD Amplifier (NRA) card had failed.

The NRA card was replaced and the channel IV surveillance was completed before returning the reactor to power.

END OF ABSTRACT

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#### A. REQUIREMENT FOR REPORT

This report is required per 10 CFR 50.73 (a)(2)(iv) because the event resulted in an unplanned automatic actuation of the Reactor Protection System (RPS).

#### B. UNIT STATUS AT TIME OF EVENT

At the time of the event, Unit 2 was operating in Mode 1 (Power Operation) at 100% of rated thermal power. A channel calibration was in progress for power range nuclear instrumentation channel IV (2N44). In accordance with procedure requirements for the channel calibration, the overpower delta-T (OPDT) and overtemperature delta-T (OTDT) bistables for RPS protection channel IV had been tripped at 1115 CST.

#### C. DESCRIPTION OF EVENT

On 2-23-91, at approximately 1137 CST, the Unit 2 Reactor Operator (RO) observed Reactor Coolant Loop 1 Low Average Temperature (T-avg) and Loop 1 Low-Low T-avg bistable status lights illuminate on the status light board in the Control Room. The RO immediately checked the Loop 1 T-avg indicator and observed it to be indicating low. Also, the Loop 1 OTDT setpoint indicator was observed to be indicating high. Recognizing that a failure of a Loop 1 narrow range temperature instrument had occurred, the Control Room operators promptly entered abnormal operating procedure 18001-C, "Primary Systems Instrumentation Malfunction." The Unit Shift

Supervisor also directed Instrumentation and Controls (I&C) personnel performing the channel calibration on 2N44 to back out of their procedure and restore protection channel IV to service. However, before any action could be taken, protection channel I OPDT, OTDT, and turbine runback bistable status lights were observed to illuminate, and a reactor trip occurred at 1138 CST. The first-out annunciator indicated that the trip had occurred on OTDT.

On the reactor trip, all control rods were observed to fully insert and a Feedwater Isolation (FWI) and an Auxiliary Feedwater (AFW) actuation occurred per design. After completing the immediate operator verifications required by emergency operating procedure 19000-C, "E-0 Reactor Trip or Safety Injection," emergency operating procedure 19001-C, "ES-0.1 Reactor Trip Response," was entered at 1140 CST. A step in procedure 19001-C requires the control board controller for steam dump to the condenser to be placed in the steam pressure mode. When this step was performed, a steam-dump-to-condenser valve (2PV-507B) failed open. Operators responded by taking the controller out of the steam pressure mode, and the steam dump valve closed. The steam dump valve was then manually isolated, and operator action was taken to close the "A" Train Main Steam Isolation Valves (MSIVs) to limit the cooldown of the Reactor Coolant System. No additional equipment malfunctions or abnormalities occurred, and at 1158 CST, unit operating procedure 12006-C, "Unit Cooldown to Cold Shutdown," was entered after the plant had been stabilized in Mode 3 (Hot Standby).

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#### D. CAUSE OF EVENT

The direct cause of the reactor trip was the trip of protection channel I bistables while protection channel IV OPDT and OTDT bistables were tripped for surveillance testing. This completed the required 2 out of 4 logic, and a reactor trip occurred on OTDT.

A subsequent review of computer data indicated that after failing low, Loop 1 T-avg had returned to a near normal value immediately prior to the reactor trip. Additionally, the computer data indicated that the Loop 1 OTDT setpoint had decreased immediately prior to the trip. Utilizing the plant simulator, it was demonstrated that if the signal from the Loop 1 T-hot narrow range temperature instrument 2TE-411A failed low slowly and then returned to normal, the actuations and indications observed prior to the trip would occur. Troubleshooting of the Loop 1 T-hot instrument channel

then found that a power supply on a Westinghouse 7300 Series RTD Amplifier (NRA) card had failed and was therefore the root cause of the reactor trip. The return of Loop 1 T-avg to a near normal value immediately prior to the reactor trip apparently caused the channel I OTDT bistable to trip due to both an indicated increase in T-avg and the rate of change of T-avg in the positive direction.

Troubleshooting of the problem that caused steam dump valve 2PV-507B to fail open found that the positioner feedback arm was loose, causing the linkage to the positioner cam to be out of adjustment. This resulted in the positioner integrating to maximum output with a zero input and caused 2PV-507B to fail open once the steam pressure mode was selected.

#### E. ANALYSIS OF EVENT

The reactor tripped as designed when the required logic was satisfied for the OTDT reactor trip. On the reactor trip, all control rods fully inserted, and a feedwater isolation and an auxiliary feedwater actuation occurred per design. Appropriate operator action was taken to isolate the steam dump valve that failed open and to limit the cooldown of the Reactor Coolant System. Based on these considerations, it is concluded that there was no adverse effect on plant safety or on the health and safety of the public as a result of this event.

#### F. CORRECTIVE ACTIONS

1. The Loop 1 T-hot NRA card that failed has been replaced and an Analog Channel Operational Test has been satisfactorily performed for the Loop 1 Delta-T/T-avg instrumentation.
2. The channel calibration for power range nuclear instrumentation channel IV was completed prior to returning the reactor to power.

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3. The problem with the positioner feedback arm on steam dump valve 2PV-507B has been corrected.

#### G. ADDITIONAL INFORMATION

1. Failed Components Identification

Westinghouse 7300 Series RTD Amplifier (NRA) Card

Part No: 2837A15G01

Steam-Dump-to-Condenser Valve 2PV-507B  
Masonelian 6-inch 40,000 Series Control Valve Equipped With  
Spring Diaphragm Actuator, Bailey AP Series Positioner, and  
Masonelian EX9000 I/P Transducer

## 2. Similar Previous Events

LER's 50-425/1989-024 and 50-424/1987-018 describe similar previous reactor trips which occurred after OPDT and OTDT bistables for a protection channel had been tripped for maintenance or testing purposes. In those events, a circuit card failure in another protection channel occurred and caused OPDT and/or OTDT bistables for the additional protection channel to trip, which completed the required coincident logic for a reactor trip.

## 3. Energy Industry Identification System Codes

Plant Protection System - JC

Main/Reheat Steam System - SB

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C. K. McCoy Georgia Power  
Vice President, Nuclear  
Vogtle Project the southern electric system  
March 21, 1991

ELV-02653  
0900

Docket No. 50-425

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D. C. 20555

Gentlemen:

VOGTLE ELECTRIC GENERATING PLANT  
LICENSEE EVENT REPORT  
FAILURE OF TEMPERATURE CHANNEL CIRCUIT CARD  
DURING NI SURVEILLANCE CAUSES REACTOR TRIP

In accordance with 10 CFR 50.73, Georgia Power Company hereby submits the enclosed report related to an event which occurred on February 23, 1991.

Sincerely,

C. K. McCoy

CKM/NJS/gmb

Enclosure: LER 50-425/1991-006

xc: Georgia Power Company  
Mr. W. B. Shipman  
Mr. P. D. Rushton  
Mr. S. H. Chesnut  
NORMS

U. S. Nuclear Regulatory Commission  
Mr. S. D. Ebnetter, Regional Administrator  
Mr. D. S. Hood, Licensing Project Manager, NRR  
Mr. B. R. Bonser, Senior Resident Inspector, Vogtle

\*\*\* END OF DOCUMENT \*\*\*

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